

DIRECT ANTIFREEZE COOLED FUEL CELL

Abstract of the Disclosure

A direct antifreeze cooled fuel cell is disclosed for producing electrical energy from reducing and process oxidant fluid streams that includes an electrolyte secured between an anode catalyst and a cathode catalyst; a porous anode substrate secured in direct fluid communication with and supporting the anode catalyst; a porous wetproofed cathode substrate secured in direct fluid communication with and supporting the cathode catalyst; a porous water transport plate secured in direct fluid communication with the porous cathode substrate; and, a direct antifreeze solution passing through the porous water transport plate. In operation of the fuel cell, because product water generated electrochemically at the cathode catalyst flows away from the cathode catalyst into the porous cathode substrate and into the porous water transport plate and because the porous cathode substrate is wetproofed, the antifreeze solution passing through the porous water transport plate remains essentially within the water transport plate. A preferred direct antifreeze solution is glycerol. In a preferred embodiment, the direct antifreeze solution passing through the water transport plate may be directed to flow at a pressure that is less than a pressure of the process oxidant stream passing adjacent the cathode substrate and water transport plate to further minimize movement of the antifreeze solution from the water transport plate to the cathode catalyst.